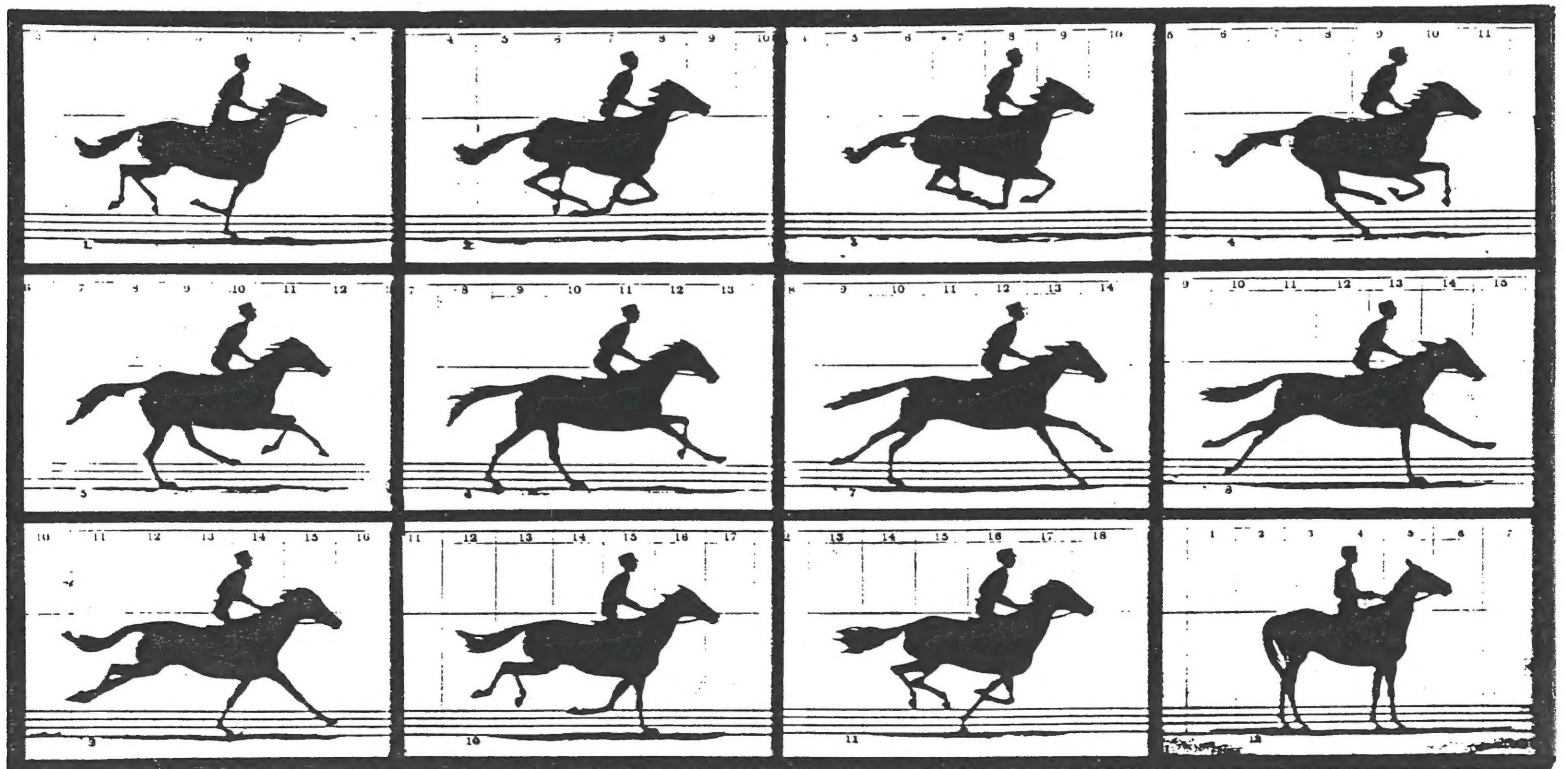
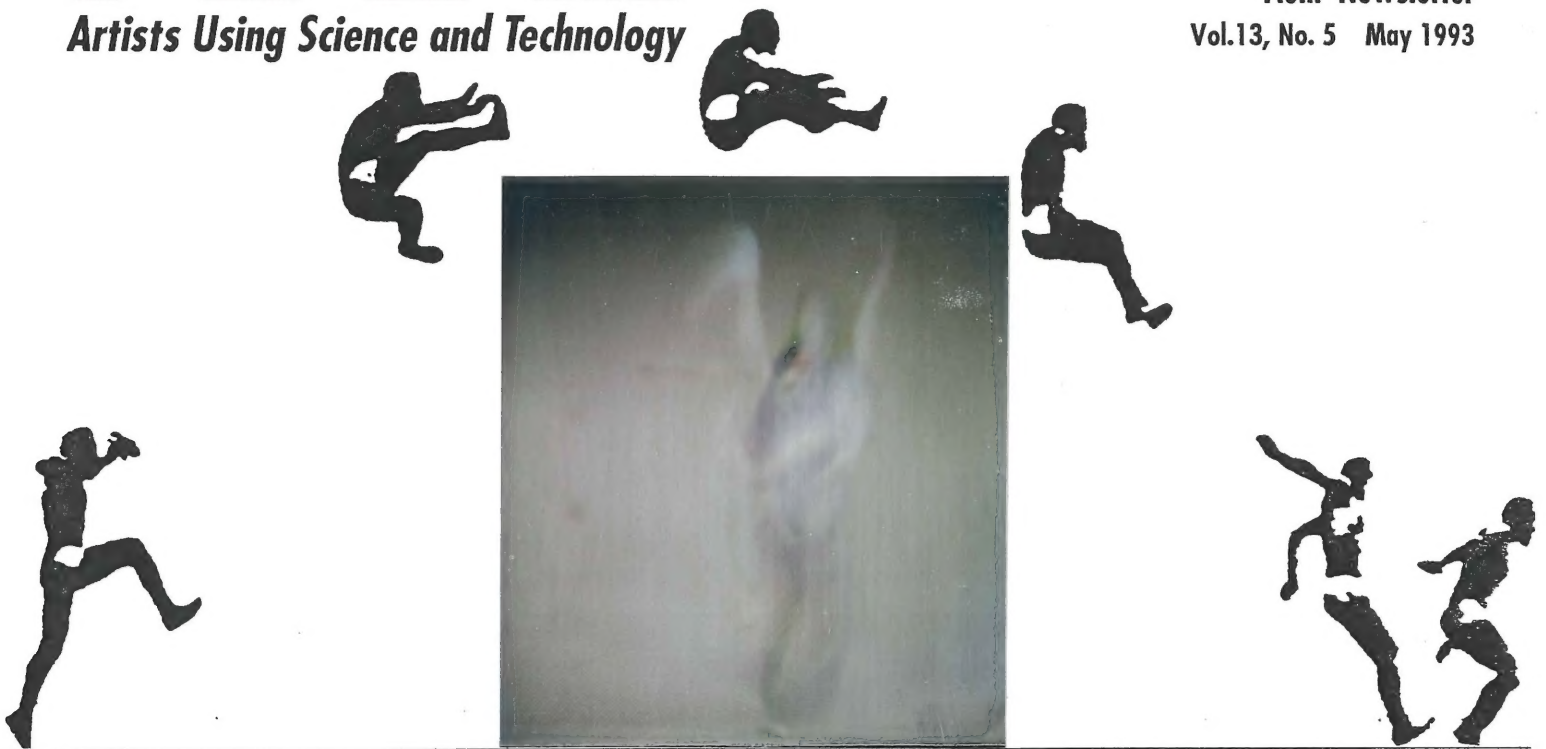


Ylem (Eye-lum): The exploding mass out of which the universe emerged in the Big Bang

**Artists Using Science and Technology**

**Ylem Newsletter**  
Vol.13, No. 5 May 1993



THE HORSE IN MOTION.

Collage by Louis M. Brill, Stereogram From LASERSMITH. Eadweard Muybridge's experiments in motion analysis were done as photographic studies in the 1870s. Over a 100 years later, a new form of motion analysis appears through Steve Smith's extended PrinTV process of embossed stereograms. In the former, motion was documented as a linear perspective, in the latter, succeeding motion images are optically stacked and reconstruct the motion as a holographic "flicker" card.



## Imaging from Life: Ready, Set, Action!

by Louis M. Brill

This month's Ylem cover, with its embossed stereogram, *Contemporary Dancer*, displays a significant perceptual breakthrough in the art of creating and viewing motion. Eadweard Muybridge discovered the transformation of motion analysis into movie projection and Thomas Edison, the movie projector. Now, on our cover we introduce a new technology that can present a moving picture without any mechanical processes: PrinTV, the animated holographic stereogram discovered by Steve Smith, a Chicago-based holographer.

The motion picture as we know it is a process of pulling a strip of film past a mechanical projection system. It is pulled fast enough that it allows projected pictures to visually merge, a perceptual illusion that creates a "motion" picture.

Smith has expanded upon the already-developed process of the embossed-foil stereogram to store and play back a collection of photographic images as a complete moving image. In so doing, the embossed-foil hologram has completely replaced the movie projector as the presentation medium using no mechanical device (no moving parts), merely an optical re-creation of a collection of still pictures—pretty heady stuff!

Smith has founded LASERSMITH (Chicago, IL) for creating custom designed embossed-foil holograms for event promotions and point-of-sales displays. The process is called PrinTV because it ties together motion and stereo perception into two-to-four-second action holograms. Smith states that people are enthusiastic. More than one has said, "This is holography as I envisioned it would be."

Smith describes the already existing holographic stereogram process as a very "un-dynamic" process with a film camera in a locked position while the subject(s) carefully rotate on a turntable past the camera. Or, the film camera is placed on a rail and moves past the subject. The problem for both existing techniques is that their "image capture"

has been very limiting. The camera is encumbered by its limited movement about the subject.

PrinTV is a new multi-camera imaging system that transforms a series of photographic images into a holographic stereogram of up to several seconds of movement by the subject. The photographic recording process that Smith devised is composed of a collection of 36 motor-driven Nikon N 2000 cameras placed on a twenty-foot metal rail giving him close to a 120° range of image capture.

The choice of 36 cameras came about by empirically walking through the photographic process several times and considering camera lens view points, size of cameras and points-of-view as measured against the subject filming area. The evaluation led him to create his multi-camera imaging system. 36 cameras was the magic number needed to establish a motion-capture system. Once the camera system is ready, it's a matter of orchestrating the set, the camera and the actor(s). "It's like making a four-second movie," observes Smith. "You call out 'action,' the subject performs in front of the cameras and you hear a very satisfying series of clicks as 36 shutters snap away."

The developed film (all 36 rolls) is mounted onto a series of light boxes. At this point, Smith states, "You walk by the rows and rows of film strips with a loupe studying the actor's movements from each take (1296 images!), asking yourself, 'Do I like how the motion moves?' Then you select that one take out of 36 shots from all the 36 cameras which becomes your designated film shot." That in turn is reimaged to produce a master film which is transferred to the optical printer and is eventually converted into its stereogram counterpart.

The cover stereogram, *Contemporary Dancer*, represents about three seconds of movement in time. This is one of several images Smith has created with his initial PrinTV process. Improvements for PrinTV will include an expansion in image recording of up to at least nine

seconds in time. Further along, Smith says, "Working with an electronic (digital) image capture system [will allow] us to manipulate the source pictures more easily. Thus depending on the desired final result, we can combine photography and computer graphic three-dimensional animations to depict any number of incredible scenes into the final stereogram. We have already begun using these combined techniques, and expect to eventually operate from a complete electronic image creation process."

Smith also sees a time when LASERSMITH could act as a service center where independent multimedia shops could make the stereogram process accessible to their clients. They could prepare a completed stereogram image file and bring to him for final processing. The completion of that file would result in a master image that would eventually be transformed into its own holographic stereogram. The beauty of expanding PrinTV's contacts, Smith observes, is that it allows more imaging styles to appear, and as that begins to happen, the medium obviously starts to evolve and new kinds of content emerge. "Ultimately this is the where the future of holographic stereogram lies," he proclaims, "in content, not technology."

Ylem thanks LASERSMITH for the donation of the *Contemporary Dancer* stereogram. For information on custom-designed PrinTV, contact Steve Smith at 312-733-5462. Also, Thanks to Louis M. Brill for making the arrangements with LASERSMITH and doing the cover design.

### Upcoming Ylem Programs

Watch for details in the June Newsletter!

**June 23 or 24: Art in the Solar Age**, talk by Jurgen Claus, Director of the Academy of Media Arts, Cologne, Germany. Possible location: San Jose.

Possibly **June 26: Field Trip** to Artist-in-Residence Program at the **San Francisco Disposal Site** with artist Jo Hanson.

**July 7: Forum: Art Outside the "Art World" System**



## Ylem Forum: Complexity

Wednesday, May 5, 7:30 pm  
McBean Theatre, The Exploratorium,  
3601 Lyon St, San Francisco  
415-563-7337

**Mark Pauline:** *Swarmers*. Pauline describes how Survival Research Labs has created a team of robots for performances that exhibit flocking behavior.

**Michael McGuire:** *The Aesthetics of Complexity*. The author of *An Eye for Fractals* believes that the study of complexity is not new. It has been a longstanding one in the arts.

**Milton Van Dyke:** *Fluid Dynamics and Complexity*. Van Dyke is the author of *An Album of Fluid Flow*.

## 2nd Annual Ylem Benefit



## Movie Magic: Tools of the Trade

**Computer Graphics, Miniatures, Creatures, Optical Effects, Ride Films, and More**

Thursday, May 27, 7-10 pm  
McBean Theatre, The Exploratorium,  
3601 Lyon Street, San Francisco  
More info: Louis M. Brill 415-664-0694

What is the future of film entertainment? Can computer graphic personalities replace actors? When horrific creatures stagger across the screen, how much is the actor, and how much a special effect? Learn about blue screen and mattes for composite filming. And making ride films: What happens when

Requested donation: \$10 members/ \$20 non-members. Seating is limited, seats are on a first-come basis. Come early!

auditorium seats literally follow the movie's actions?

Ylem is pleased to announce a benefit forum on *Movie Magic* and the tools of the trade that create and illustrate the fantasies and the magic that stream across the silver screen. Panel members representing some of the top San Francisco Bay Area post-production houses in film entertainment talk about their past successes and future possibilities in creating movie magic for the silver screen.

This event is a benefit for Ylem to continue its efforts in producing educational resources and services on art technology.

### Program:

A speaker from **Xaos** (*The Lawnmower Man*, *Infrared Rose*, *Liquid TV*)

"Computer Graphics: From Software to Celluloid"

**Pacific Data Images (PDI)** (*MTV*, *The Babe*, *Terminator 2*, *Toys*)

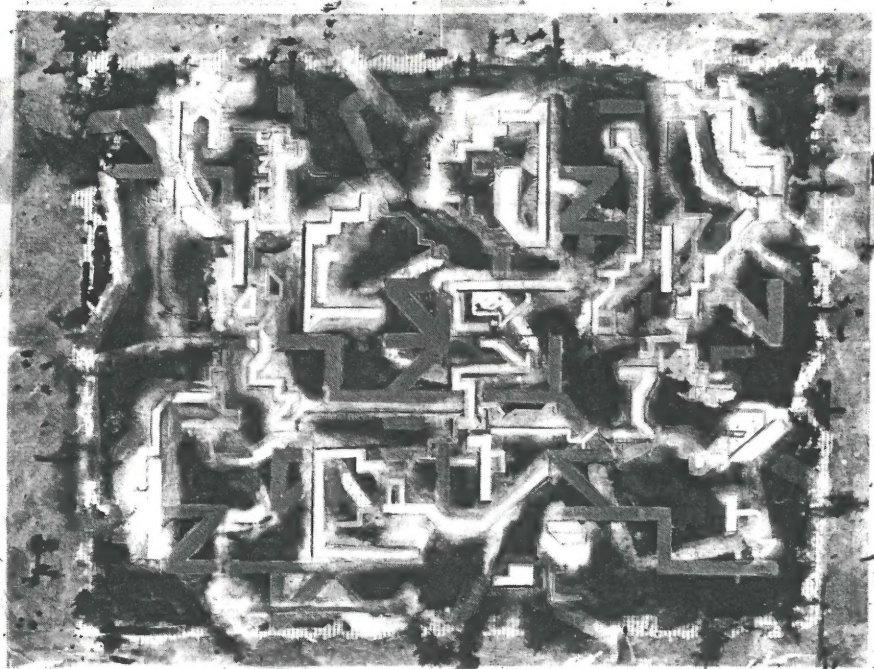
Graham Walters will present:  
"Computerized Puppets: Taking Pinocchio to the Next Step"

**CW1 Affiliates** (*Gremlins*, *Enemy Mine*, *The Fly*, *Naked Lunch*)

Chris Wallas and Jim Isaac will present: "Creature Effects and Other Strange Things That Go Bump in the Night"

**Midland Productions** (*Seaworld of Florida*, *MGM Grand Movieworld*, *Iwerks Entertainment*)

Yas Takata, V.P. of productions, will present: "Making Ride Films: A Truly Moving Experience"



*Eastern Zone* by Karen Guzak, who combines order and chaos in her work to create complexity.

Sculptor **Michael Brown** will describe his Exploratorium exhibit, *Meanderings*

**Mark Carranza:** *Mirroring of Mind*. Evolving sharable mental systems as art. Carranza is founder of Society for the Prevention of Design.

### In Addition to the Forum:

Before the program, plan to tour the Exploratorium display on the Game of Life; and these new interactive art

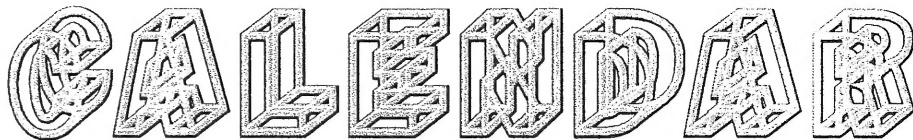
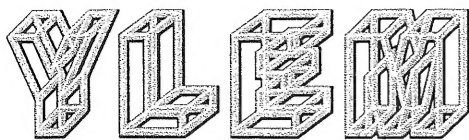
pieces: *Meanderings*, a water display by Ylem member Michael Brown; *Cloud Rings* by Ned Kahn; *Water Waves*, a video work by Andrej Zdravic; and one on erosion called *Terraforms* by Al Jarnow.

In the lobby at intermission:

**Trudy Myrrh Reagan:** Demonstration of paper marbling.

**Jim Thompson:** LED arrays.





## Events

May 5, 7:30 pm

**Ylem Forum: Complexity** Details on page 3

May 14-15

### **The Third International Conference on Cyberspace (Austin, TX)**

How networks, groupware, and hypermedia might someday function together to create a true, public cyberspace, as well as private, special-purpose cyberspaces.

**The University of Texas at Austin**

May 18-23

### **National Educational Film & Video Festival**

Festival Week Registration **Deadline: May 11, 1993.** The National Educational Film & Video Festival is a showcase that brings together people in the fields of educational, broadcast, and home video markets. One week of seminars and workshops, including funding techniques, interactive multimedia and video production in the classroom. **National Educational Film & Video Festival, 655 13th Street, Oakland, CA 94612-1220; 510-465-6885; fax: 510-465-2835**

May 21-22, 9 am-6 pm

### **Understanding Images (New York City)**

Co-sponsored with the Pace University School of Computer Science. A multidisciplinary conference bringing together participants from the physical, biological and computational sciences, together with artists, psychologists and philosophers, to discuss understanding images within the computer graphics context. **Dr. Francis T. Marchese, Computer Science Department, NYC/ACM SIGGRAPH Conference, Pace University, 1 Pace Plaza Room T-1704, New York, NY 10038; 212-346-1803; fax: 212-346-1933; marchsf@pacevm.bitnet**

May 25

### **BodySynth on cable TV (nationwide)**

BodySynth (described in *Needs and Offerings*) will be featured on the Discovery Channel on May 25. Two shows: 6:30, 9:30 PDT. Also, on Sunday, May 30 at 10:30 pm., *Next Step*, from San Francisco KRON Channel 4 will feature it. **Check local cable TV listings.**

May 26-29

### **Multimedia '93 (Toronto)**

Metropolitan Toronto Convention Center, Canada. Conference and trade show on photography, graphic design, CAD design, digital imaging, prepress, presentation, film/video, multimedia production, etc. **Multimedia Trade Show, Inc., 7-70 Villarboit Crescent, Concord, Ontario, L4K 4C7; 416-660-2491**

May 27, 7 pm

### **Ylem Fundraiser: Movie Magic**

Details on page 3.

May 31 - June 6

### **Desert Siteworks:**

#### **Preparing the Ground (Nevada desert)**

Collaborative art-making, performance, high adventure and hijinks in Nevada's Black Rock Desert, always over the full moon. The advance group will transform a desert site, adding overlays of earth art, giant sandpaintings, site sculpture, assemblage; deconstructed "ruins," sundials, solstice/equinox alignments and more. Performance group over the weekend will stage a ritual and a nouveau/retro art happening and get it on film. Collaborators sought: fine artists, builders, earth artists, actors/performers, theatre tech people. **Imago Photon 415-488-9864; Ruby West 415-824-2260; Sebastian Melmoth 510-420-1592**

Through June

### **Visionary Computer Art (Tokyo)**

Part of the International Future Images Exhibition. **Toshihiro Yatsumonji, Fuji Television Network Inc., Special Events, 3-1 Kawada-cho, Shinjuku-ku, Tokyo, Japan; tel. 81-3-33531111; fax: 81-3-33594224**

Through June 6

### **ARTEC '93 (Nagoya, Japan)**

3rd International Biennale in Nagoya. An event of art and technology, with international competition exhibit, lighting & illumination, symposium. **ARTEC '93, c/o the Chunichi Shimbun 1-7-1, Sannomaru, Naka-ku, Nagoya 460-11, Japan; 052 221 0753; fax 052 221 0739**

June 14-18

### **Ars Electronica 93 (Linz, Austria)**

Festival for Art, Technology, Society. Theme: Genetic Art—Artificial Life. Symposium featuring international geneticists. Exhibitions, including display of Prix Ars Electronica award winners. Videos and computer animations of art and science. Cross-culture music. **Ars Electronica, Bruchnerhaus, Untere Donaulände 7, A-4020 Linz, Austria; tel. 0732 7612-0; fax 0732 78 37 45**

Through August 31

### **The Steel Pan Project**

Beginning in April, the Exploratorium and Mills College present The Steel Pan Project, a series of free interactive public workshops, demonstrations, and classes exploring the history, development, & music of the steel pan of Trinidad, West Indies. The steel pan is the

All events and exhibits occur in the San Francisco Bay Area except where noted. Is your event or exhibit listed here?

Send to Ylem Editor, 967 Moreno, Palo Alto, CA 94303; [trudymyrrh@aol.com](mailto:trudymyrrh@aol.com)

only widely-used instrument invented in the twentieth century. **The Exploratorium, 3601 Lyon St., San Francisco, CA 94123; 415-561-0361**

## Exhibits

May 14 - September 6

### **Environmental Art at the Exploratorium**

Focusing on the movements of waves, clouds and flowing water and their interplay on and with the Earth's surface, four artists, Ylem members Michael Brown, Al Jarnow, Ned Kahn, and Andrej Zdravic show new artworks that capture some of the complex phenomena which occur naturally on the earth's surface: cloud formations, the sculpture of landscapes, stream and river meander patterns and wave motion. **Exploratorium, 3601 Lyon Street, San Francisco, CA 94123; 415-563-7337; 415-561-0307**

May 14 - September 19

### **Images du Futur '93 (Montreal)**

The largest exhibition on art, new technologies and communications in the world: holography, computer animations, virtual reality, interactive sculptures, multimedia installations, etc. Interactive exhibition for the general public. **Mario Tremblay, 514-849-1612; fax 514-982-0064; La Cite des Arts et des Nouvelles Technologies de Montreal, 15. rue de la Commune ouest. bur. 101. Montreal, Quebec, Canada H2Y 2C6**

Through May 21

### **Where We Are**

Ylem Editor Trudy Myrrh Reagan shows her paintings that simulate how Earth looks from 50 miles up, and two new backlit paintings using science images. The latter are acrylic paintings on clear plexiglas. **Palo Alto Medical Clinic, 300 Homer Ave., Palo Alto, CA 94301; info: Trudy, 415-856-9593**

Through May 30

### **Transformations:**

#### **Color Laser Images by Helen Golden**

Golden is an artist/photographer currently exploring the creative possibilities of the Canon CL500 laser color printer. **Color Magic, 2551A Casey Ave, MountainView, CA; 415-968-7661**

Through June 6

### **Shin Takamatsu**

An environmental installation on the work of eminent Kyoto-based architect, Shin Takamatsu, features everything from blueprints to actual constructions. But the star feature is a 3-D HDTV display of his Art Deco and Bauhaus constructions. Admission \$4. **San Francisco Museum of Modern Art, 401 Van Ness at McAllister St., San Francisco; 415-863-8800**

Through June 22

### **Rodin/Claudel Variations**

Ylem member Edith Smith is exhibiting her "Rodin/Claudel Variations, 36 works in watermedia. Institute for Research on Women and Gender, Stanford University, Stanford, CA

### **Osmosis: Ettore Spaletti and Haim Steinbach**

In the *Osmosis* series pairs of artists from fields as different as filmmaking and architecture will work collaborate on truly hybrid works of art. *Osmosis* will continue for three years. In this debut exhibit, an installation pushes recontextualization of materials to new limits. Guggenheim Museum, 1071 Fifth Avenue, New York, NY; 212-423-3840; fax 212-941-8410

## **Opportunities**

Deadline May 1

### **Interface '93 (Marietta, GA)**

Call for papers. Presentations limited to 20 minutes. The 18th Annual Conference for Humanities and Technology, Atlanta, Oct. 21-23. Send abstracts (100 word single-spaced top center edge) to: **Interface '93 Humanities and Social Sciences Department, Southern College of Technology, 1100 South Marietta Parkway, Marietta GA 30060-2896; 404-528-7202**

Deadline May 7

### **Creativity '93**

Art Direction's 24th Annual Competition. Eligible: All material in print or on the air 5/92-5/93. Video format: 3/4". Fees \$20-75. Prospectus: **Creativity '93, 10 East 39th St., New York City**

Deadline May 7

### **National Showcase Exhibition**

Open to "emerging and underrecognized artists." 2 and 3D media and videos; 2D max. 50", 3D max. 50 X 50 X 36", video (1/2" VHS). \$15/up to 2 slides or 1 video. Show opens in July. Insured on premises, SASE to: **Exhibition Committee, Dept. 100, Alternative Museum, 594 Broadway, #402, New York, NY 10012; 212-966-4444**

Deadline May 7

### **New Impressions**

Photography in the 1990s. The Best of Show Award will be a tuition-free workshop of your choice at Anderson Ranch Arts Center in Snowmass Village, CO, with private room and board. Additional awards. **Juried Exhibition Prospectus, Light Impressions Spectrum Gallery, Dept. 877R, PO Box 940, Rochester, NY 14607-0940; 800-828-6216**

Deadline May 14

### **Cepa Gallery**

Reviewing photographic work "encompassing color and any photographically based process (traditional or alternative). We are open to all approaches in terms of content, context, format, and use of materials." Send up to 20 slides (labelled with number, name, "top"), checklist (name, address, phone #, title, date, image size, process, presentation size), resume, statement, other support materials, SASE. **Robert Hirsch, CEPA Gallery, 700 Main St., 4th FL., Buffalo, NY 14202; 716-856-2717**

Deadline May 14

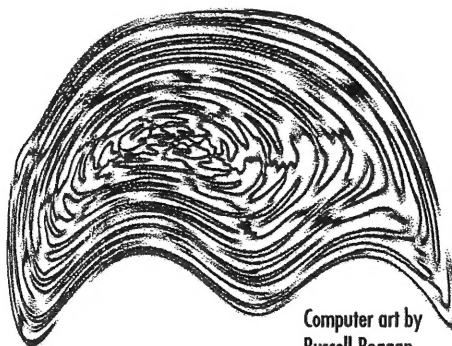
### **Color in Contemporary Holographic Practice**

Open to color photographs and/or photo-based work. Send 20 slides, slide list, support materials, SASE to: **Robert Hirsch, CEPA, 700 Main St., 4th FL., Buffalo, NY 14202, 716-856-2717**

Deadline May 15

### **Interactive Multimedia Competition Awards**

Co-sponsored by The New York Festivals and Knowledge Industry Publications. An annual forum for the exchange of program ideas among working professionals in public television. Categories include educational, consumer entertainment, crafts and techniques. Format: 3/4" U-matic, 1/2" VHS, PAL. Entry form required: **The New York Festivals, 655 Avenue of the Americas, 2nd floor, New York, NY 10010**



Computer art by  
Russell Reagan

Deadline May 25

### **Heavy Metal, Punk Barbarian**

Open to U.S. artists. Wall-mounted media; size limitations determined by UPS. \$10/up to 6 slides. Show July 11-Aug 6 at Gallery Sanchez, San Francisco. For details, send SASE to: **Wayne Wright, P.O. Box 6562, Albany, CA 94706; 510-527-6894**

Deadline May 28

### **California Works**

The California State Fair Fine Arts Competition. Open to all media. \$17,250 in cash awards.

Categories include: Artwork Utilizing New Technologies. Fee \$10 per artwork. Exhibit dates: 8/20-9/6. Info, entry forms: **California Works/California State Fair, Box 15649, Sacramento, CA 95852; 916-263-3146**

Deadline May 31

### **Marin County National Film and Video Competition**

Open to all U.S. residents. Awards. Categories: Film: Independent, Animated, Student; Video: Independent, Experimental, Student. Formats: 3/4" video, 16 mm film. 30 min. maximum. Fee: \$10. **Marin County Fair and Exposition, San Rafael, CA 94903; 415-499-6400**

Deadline May 31

### **Utah Short Film and Video Festival**

Categories include: Animated, Experimental. **Utah Short Film and Video Center, 20 S. W. Temple, Salt Lake City, UT 84101; 801-534-1158**

Deadline June 23

### **Neon Elvis**

Neon works ready to display, including transformer/hanging apparatus/base and 15' 110 volt cord. No entry fees; juried from photos. Show Sept. 11-Oct. 22. 40% commission. **Let There Be Neon City, 38 White St., New York, NY 10013; 212-226-4883**

Deadline November

### **Networking Projects Wanted: FISEA 93**

FISEA 93, to be held in Minneapolis in November 1993, is seeking proposals for papers and panels on networking among artists and networking projects. Please send proposals before May 15 to: **jzgrover@mcad.edu; J.Z. Grover, Artpaper, 2402 University Avenue West, St. Paul, MN 55114**

Deadline Unclear

### **Edugraphics '93 (Algarve, Portugal)**

Submissions sought for conference Dec. 6-10. The conference aims at gathering together outstanding educators in graphics, which will give keynote lectures reviewing, presenting the state-of-the-art and discussing future directions on their respective fields. The conference will be open to contributors from all ranks and from all over the world. Graphics will be subject of a wide and comprehensive point of view. **EDUGRAPHICS '93 Hotel Alvor Praia, Alvor, Algarve, Portugal Details from: Harold P. Santo Department of Civil Engineering Technical University of Lisbon Av. Rovisco Pais, 1 1096 Lisboa Codex, Portugal; tel. + fax: +351-1-848-2425; d1663@beta.ist.utl.pt**

### Cepa Gallery II (Buffalo, NY)

Seeking proposals for use of its digital room. Room is 10 X 12', one doorway, monitor can be mounted in wall across from doorway, lighting adjustable, room can be painted (even black OK). CEPA can provide a monitor, speakers, Amiga computer, two VHS decks. **Matt McElligott, CEPA Gallery, 700 Main St., 4th fl., Buffalo, NY 14202; 716-856-2717**

### Critical Digital Post-Computer Art. (Tampa, FL)

Exhibition/conference presentations are open to artists who use digital systems to create critical, theoretical, conceptual, and personal works moving beyond previous notions of "computer art". Digital photography, printworks, books, public engagements, subversive interactions, etc. are desired. Send slides, artist's statement, resume, SASE to: **Joseph Delappe College Of Fine Arts, University Of South Florida 4202 East Fowler Avenue, Fah 110, Tampa, FL 33620**

### Graphic Design Teaching Position Available (Mississippi)

Mississippi State University: Assistant/Associate Prof. of Art, tenure track. Start August 16, '93. MFA or BA/BFA with extensive professional experience. Computer experience desired. Teach graphic design, typography, illustration. Teaching experience preferred. Send a letter of application, resume, 3 letters of reference, 20 slides of current work, 20 slides of student work (if available). SASE for return of materials. A/D 4/15/93 or until position filled. AA, EOE, WMA. To: **Dr Paul Grootkerk, Dept of Art, Box 5182, Mississippi State, MS 39762**

### Needs/Offerings

May 24, 7-9 pm

#### The BodySynth

Monday evening workshop with The BodySynth, created by dancer Chris van Raalte and Ed Severinghaus, engineer and Ylem member. It is an experimental technology that translates body movement into electronic sounds, making the human body into a virtual musical instrument. \$20. And check out other workshops in this series! Info: **Zankros InterArts, 614 York St., San Francisco, CA 94110; 415-282-5497; fax 415-282-4228**

*Some calendar items reprinted from Art Calendar (PO Box 199, Upper Fairmount, MD 21867. Subscriptions \$32/yr.), Video Networks (from Bay Area Video Coalition), and FineArts Forum e-mail.*

### A Career in Multimedia

Workshop topics covered: Current multimedia product demonstrations, job skills in demand, how to break into the business focusing on leveraging skills in video production, trends affecting employment, pay and commercial vs. industrial considerations. **Bay Area Video Coalition, 1111 17th Street, San Francisco, CA 94107; 415-861-3282; fax: 415-861-4316**

### A-Life Digest

Artificial Life Distribution List—All list subscriber additions, deletions, or administrative details to: **alife-request@cognet.ucla.edu**. All software, tech reports to A-life depository through anonymous ftp at: **ftp.cognet.ucla.edu in ~ftp/pub/alife (128.97.50.19)**

### Art & Science Collaborations, Inc. (ASCI)

Ylem member Peter Terezakis was one of ASCI's founders. Ylem members who want a New York connection, especially kinetic artists, should consider joining this organization as well as ours. They publish a resource list of pertinent grants, exhibition sites, artist-in-residence programs, materials catalogs, and science and technology centers; also a quarterly newsletter and annual directory. A talent bank is maintained.

We commend their kinetic art shows in the Staten Island Ferry Terminal and other public places. Membership: \$30 per year (tax-deductable). Info: **Cynthia Pannucci, Artistic Director, PO Box 040496, Staten Island, NY 10304-0009; 718-816-9796**

### Electronic Portfolio

*Sight Specific* is an electronic portfolio set up by Ann Sutton and Jennie Connelly to provide architects, designers and clients with an accessible way of contacting and commissioning designers. It will use the new Kodak Photo-CD system to offer full color visuals of selected maker's work. **Sight Specific, 40 Tarrant St, Arundel, W. Sussex, BN18 9DN, UK; tel. +44 (0)903 883838**

### Help High School Art Students!

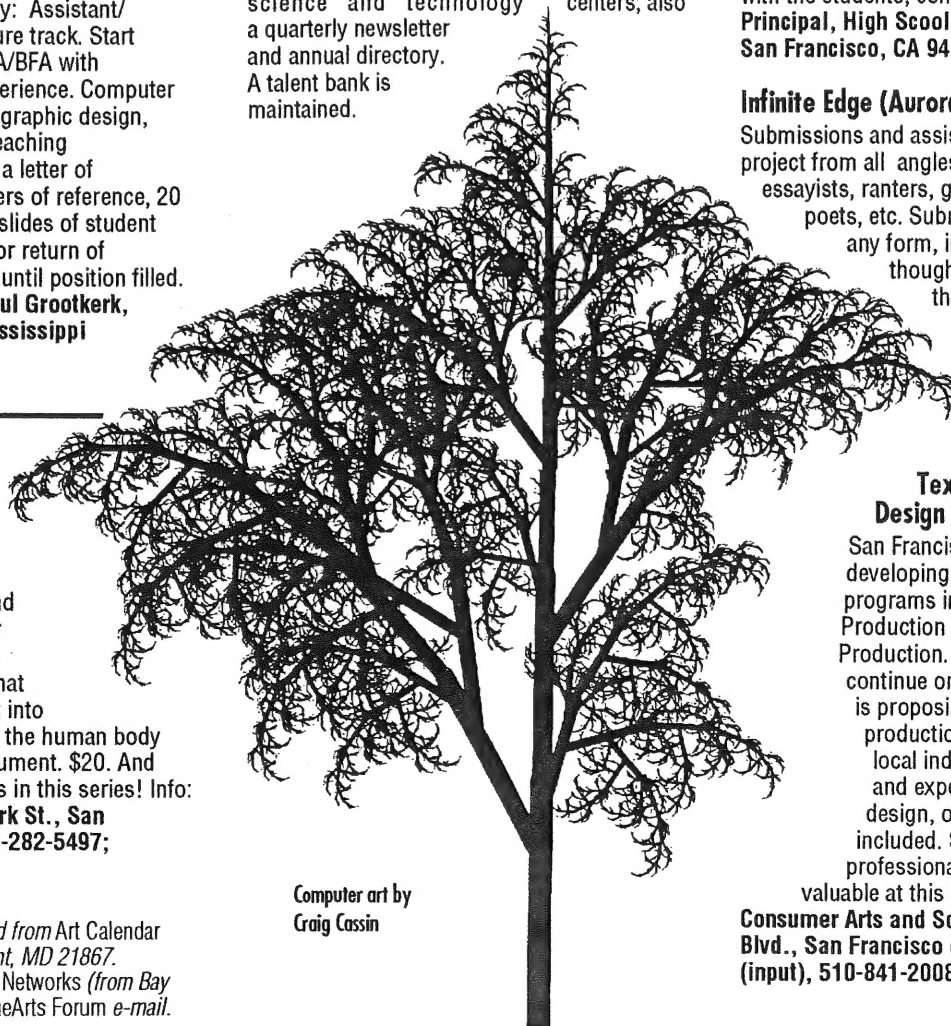
This year, San Francisco School District, spurred by a committee on which Ylem member Ruth Asawa serves, inaugurated The High School of the Arts near the campus of San Francisco State College. Plans for its computer lab are underway. However, it has scant funds for supplies and enrichment activities. To donate supplies or to do a project with the students, contact: **Charles Roberts, Principal, High School of the Arts, 700 Font St., San Francisco, CA 94132; 415-469-4027**

### Infinite Edge (Aurora, CO)

Submissions and assistance sought for this project from all angles: fiction writers, essayists, ranters, graphic designers, artists, poets, etc. Submissions are welcome in any form, in any style, in any tone, though that is not a guarantee that everything received will be printed. **Andy Hawks, 4290 South Mobile Cir. #D, Aurora, CO 80013; ahawks@nyx.cs.du.edu**

### Textile and Apparel Design Training

San Francisco City College is developing two-year certificate programs in Apparel Design/Production and Textile Arts Design/Production. Certificate students may continue on at SFSU for BA. SFC is proposing a state-of-the-art production facility linked with local industry to offer training and experience. Computer design, of course, will be included. Suggestions from professionals in the field would be valuable at this point. **Sandy Ericson, Consumer Arts and Science Dept., 50 Phelan Blvd., San Francisco (info); Joy Stocksdale (input), 510-841-2008**



Computer art by  
Craig Cassin



## Books about Complexity

reviewed by Trudy Myrrh Reagan

### **Complexity: The Emerging Science on the Edge of Order and Chaos**

by M. Mitchell Waldrop (Simon & Schuster, NY 1992, \$23 hardcover)

In 1975, Benoit Mandelbrot invented what he called the "mathematics of wiggles," naming the functions he was exploring *fractals*. In several fields he noted that disorderly problems, ones with nonlinear equations which had always been shunned, were now amenable to exploration. About ten years ago, research in disparate fields such as meteorology and biology began to be linked by the new theory of *chaos*. Fractals were subsumed under the mathematics of chaos. Computer graphs of chaos and fractals made understanding the data easier, and their visual beauty drove many artists wild with delight.

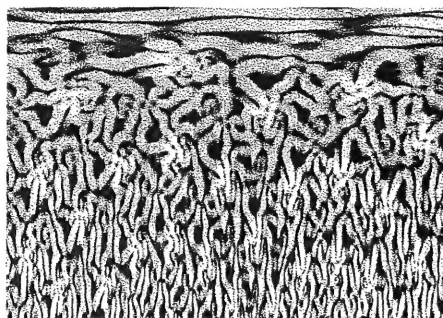
All knowledge is one. Yet, the way turf is divided up in university and research settings, compartmentalized thinking gets Nobel prizes and forging links does not. Therefore, unifying elements between fields are too often missed. But suddenly, economists, physicists, biologists, computer scientists, neuropsychologists and others have come together to hatch yet another unifying principle using nonlinear equations and computer simulations: *complexity*. The focus of activity is at the Santa Fe Institute in New Mexico. George Cowan, former head of research at Los Alamos, founded it in 1984 to counter what distressed him about contemporary science: tunnel vision.

Quotes from the book help help define complexity:

Think of the way a leaf seems to flutter in a steady breeze... the complexity is pretty simpleminded. There is one set of forces—from the wind, in the case of the leaf. Those forces can be described by one set of mathematical equations. And the system just blindly follows those equations forever. 'I wanted to go beyond that, to richer forms like biology and the mind,' says [mathematician Norman] Packard....

Darwin didn't know about self-organization—matter's incessant attempts to organize itself into ever more complex structures, even in the face of dissolution... So the story of life is, indeed, the story of accident and happenstance, declared [biologist Stuart] Kauffman. But it is also the story of order: a kind of deep, inner creativity that is woven into the very fabric of nature....

"At each new level of complexity, entirely new properties appear. [And] at each new stage, entirely new laws,



Computer art by Russell Reagan

concepts, and generalizations are necessary, requiring inspiration and creativity to just as great a degree as in the previous one. Psychology is not applied biology, nor is biology applied chemistry." (Physicist Philip Anderson on properties of emergent structures)....

And suddenly [physicist Murry] Gell-Mann and the others realized that they'd left a gaping hole in their agenda: What do these emergent structures actually *do*? How do they respond and adapt to their environment?...

Ecosystems, economies, societies—they all operate according to a kind of Darwinian principle of relativity: everyone is constantly adapting to everyone else.... Organisms in an ecosystem don't just evolve, they co-evolve....

It is the zone of complexity where the most creative things happen. For example, the most flourishing incubator of life on earth is not the seashore (too much simplicity) nor the ocean depths (too chaotic), but on the continental shelf (where complexity can organize into interdependent systems). The most

interesting life systems, it is said, abide at the very edge of the shelf. This suggested to me the following: Too simpleminded = Kitch, wonderfully novel and complex = Art, too chaotic = Gibberish. And, funny thing: Some of what sounds like gibberish to one generation is poetry to the next, meaning that the audience co-evolves with the artists, writers and composers.

M. Mitchell Waldrop's book approaches the subject as the story of an idea. We become intimate with the idea through biographies of the researchers involved. This method may seem long-winded to the technician aching for details, but this makes "complexity" vivid to the lay-person.

Artists have a fine-tuned sense of what is interesting, what is lifelike. Some Ylem members are already experimenting with one aspect of complexity, Artificial Life, where mechanical objects communicate with each other and utilize "flocking behavior." We await in zealous anticipation to see what else "complexity" means for the arts.

### **Complexity: Life at the Edge of Chaos**

by Roger Lewin. (Macmillan, NY, 1992, \$22). The author, a skeptical biochemist, dialogs with researchers whom he interviews. Lewin emphasizes dynamical systems in biology and ecology. For instance, we learn that organisms living at the edge of chaos gain advantage from being able to process information. This may have brought about the evolution of social insects, like ants.

Controversy permeates the book. Biologists have long repudiated Social Darwinism, and with it, the idea of progress in evolution. Likewise, the Gaia theory to them smacks of mystical vitalism. That computational models so easily create complexity and large-scale homeostasis is profoundly unsettling to many of them. A similar contrast exists between old, materialist explanations of consciousness and a still-nebulous sense that neuronal networks at some point develop into emergent structures with new properties of self-awareness. Both books are very readable.

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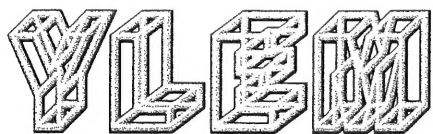
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*Knight's Tour* by Ronald R.  
Brown. In chess, the knight  
makes the most complicated  
move. In 64 moves, it can  
cover the chess board, but  
the trick is to make a series  
of moves that creates a  
pleasing pattern.



**Artists Using Science and Technology**  
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